

XXXII. *Observations on the Transit of Venus over the Sun, on the 6th of June 1761: In a Letter to the Right Honourable George Earl of Macclesfield, President of the Royal Society, from the Reverend Nathaniel Blis, M. A. Savilian Professor of Geometry in the University of Oxford, and F. R. S.*

*To the Right Honourable the Earl of Macclesfield,
President of the Royal Society.*

My Lord,

June 11, 1761.

Read June 11, 1761. **T**HE present bad state of health of my worthy friend and colleague Dr. Bradley, his Majesty's Astronomer, prevented him from making the proper observations of the transit of Venus on Saturday morning last; and consequently, has deprived the public of such as would have been taken by so experienced and accurate an observer. But as the doctor was pleased to desire me to attend at the Royal Observatory, to supply his place, I have presumed to lay before your Lordship, and the Royal Society, the observations I there made, with great care, and as much accuracy, as the unfavourable state of the heavens would permit. The instruments we proposed to use, were a reflecting telescope, of two feet focal length, to which was fitted Mr. Dollond's micrometer, both executed by Mr. Short. There were some additions necessary to be

be made to that instrument, which could not be completed before Tuesday evening, the 2d instant, and which we received at the Observatory, early the following morning. But as it is absolutely necessary, that the telescope should be nicely adjusted to distinct vision, for the observer's eye, otherwise the apparent angle, measured by the micrometer, will not be exactly true; and as the eyes of different observers may vary very much; the weather was so very unfavourable, that I had not so much as one opportunity of seeing any celestial object, whereby I might fit it to the proper focus of parallel rays for my eye. Mr. Green therefore, Dr. Bradley's assistant, was the only person who could use that instrument, having adjusted it to his eye some time before. The instrument I made use of myself, was an exquisite micrometer, of the old form, made by the late Mr. Graham, adapted to an excellent refracting telescope of 15 feet focal length. The sky was so very cloudy the morning of the transit, and the apparent probability of its clearing up so very small, that we almost despaired of being able to make any observation; for we had but one glimpse of the sun, and that only for about half a minute, till half an hour after seven o'clock. We then prepared to observe the distance of Venus from each limb of the sun, on the chords parallel to the equator, by Mr. Green, with the reflecting telescope, and its micrometer; and I myself, with the refracting telescope, and the old micrometer, observed differences of right ascension and declination from the consequent and southermost limb of the sun.

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The weather was more favourable at your Lordship's own observatory at Shirburn-Castle, where the Reverend Mr. Hornsby, Fellow of Corpus-Christi College in Oxford, attended, to assist Mr. Phelps and Mr. Bartlett, your own observers. Mr. Hornsby has favoured me with a copy of the observations there made; and writes, that though the morning seemed very unpromising, yet the clouds began to disperse about half an hour after five, moving slowly towards the east. He then made many observations of the differences of Venus and the sun's limb in right ascension and declination, in the same manner which I used at the Royal Observatory, the sky free from clouds, and the air tolerably clear. I shall not at present lay these observations, or my own, or Mr. Green's, before your Lordship and the Society, as the shortness of the time will not permit me to examine how well they correspond with each other, or what degree of exactness may be depended upon from them.

The continual swift motion of flying clouds, of different densities, over the disk of the sun, were no small prejudice to our observations at Greenwich, till the end of the transit was approaching, when it was tolerably clear, a small haziness only remaining. We observed the internal contact of Venus with the sun's limb, Mr. Green having taken off the micrometer with the two feet reflector, Mr. Bird, mathematical instrument-maker in the Strand, with a reflector of 18 inches focal length, of his own making, and myself with the refractor, the telescopes used by Mr. Bird and myself magnifying about 55 times, that by Mr. Green 120 times, June 5th, 1761, at
20h

20^h 19' 00'' apparent time, all three agreeing to the same second. The final egress by Mr. Green and myself, was only one second later than by Mr. Bird, at 20^h 37' 9'' apparent time. At 20^h 26' 56'', by the mean of five observations, the center of Venus was north of the sun's south limb in declination, by my micrometer 3' 20''. The diameter of Venus was once measured by Mr. Green, with Dollond's micrometer, 57''; by Mr. Canton in Spital-Square, being the mean of three good observations, with the same kind of micrometer, 58''. The sun's horizontal diameter was observed by Mr. Bird, with the reflector, 31' 36'', which I suspect is three or four seconds too large, as the telescope was not accurately adjusted for parallel rays to his eye.

The internal contact was observed by Mr. Hornsby, on the north side of the observatory at Shirburn-Castle, with an excellent 12 feet telescope and micrometer, made by Mr. Bird, of the old form; and by Mr. Phelps, on the south side, with your Lordship's 14 feet telescope; the telescope used by Mr. Hornsby magnifying 68 times, and that by Mr. Phelps about 55 times; by Mr. Hornsby at 20^h 15' 10'' apparent time, by Mr. Phelps four seconds later, Mr. Bartlet counting the clock, which each observer could hear. Mr. Phelps lost the final contact, by mistaking the teller of the clock. Mr. Hornsby makes it at 20^h 33' 17''; but supposes it to have happened a few seconds later; for, at 20^h 33' 12'', it was not quite gone off the sun, when he was obliged to move his eye-stand, and 20'' after, it was certainly totally emerged. They make the diameter of Venus 56'', and Mr. Hornsby, by a mean of twelve observations,
made

made a little before and after the noon of the 5th, makes the diameter of the sun at right angles to the equator, with his micrometer, $31' 32''$. At $20^h 12'$ apparent time, Mr. Hornsby, by one observation, makes the center of Venus north of the sun's south limb in declination, $3' 26''$. The latitude of the observatory at Shirburn-Castle is $51^{\circ} 39' 22''$, being to the north of the Royal Observatory $10' 43''$. The difference of longitude between them has been determined, by some former observations, to be $4' 1''$, that of Shirburn being to the west. These are all the observations which are come to my knowledge, and which I think, at present, worthy the attention of your Lordship, and the Royal Society. If the others should hereafter appear to be so, they shall be laid before you, by

Your Lordship's

and their most obedient

humble servant,

Nathaniel Blis.